

Pacific Tanaidacea (Crustacea): Revision of the Genus *Agathotanaïs* with Description of Three New Species

KIM LARSEN

Department of Biological Science, Macquarie University, Sydney NSW 2109, Australia
klarsen@rna.bio.mq.edu.au

Present address: Zoological Museum, University of Copenhagen,
Universitetsparken 15, 2100 KBH East, Denmark

ABSTRACT. New Pacific material of the cosmopolitan genus *Agathotanaïs* Hansen, 1913 has made a generic revision possible. Newly discovered character states for the antenna have made it necessary to modify the generic diagnosis. Three new species—*A. manganicus* and *A. ahyongi* from the central Pacific and *A. spinipoda* from the continental shelf and slope off southeastern Australia—are described, they increase the number of species in the genus to eight. A key to the females of *Agathotanaïs* species is provided. Sexual dimorphism is generally restricted to the presence of pleopods in the male. The characters defining *Agathotanaïs* are considered apomorphic within the Tanaidomorpha. The distribution pattern of *Agathotanaïs* is discussed.

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The vast abyssal plain of the Pacific Ocean is practically unexplored. Within the Pacific, the Australian region represents an area of particular interest since Australia was the last landmass to separate from Antarctica. The Australian crustacean fauna is considered both archaic and diverse (Poore & Wilson, 1993). The southern region of Australia contains elements derived from the Tertiary circumpolar Weddellian fauna (Poore, 1994). Because of the long period of isolation, Australia has a high degree of endemism (e.g., about 90% for isopod crustaceans, N.L. Bruce, pers. comm.). This region has, therefore, the greatest potential for discovery of new invertebrates (Poore *et al.*, 1994).

Hansen erected the genus *Agathotanaïs* in 1913 for the species *Agathotanaïs ingolfi*. The latter is found in large numbers throughout the deep North Atlantic (Hansen, 1913; Lang, 1971b; Bird & Holdich, 1988; Larsen, in press). Subsequently, four closely related species have been described. *Agathotanaïs splendidus* Kudinova-Pasternak, 1970 from the northwest Pacific (2 specimens), *A. hanseni* Lang, 1971b from the Central American Pacific slope (5 specimens), *A. ghilarovi* Kudinova-Pasternak, 1989 from the Indian Ocean (29 specimens) and *A. brevis* Kudinova-Pasternak, 1990 from the South Atlantic (1 specimen). The genus is represented in all oceanic regions of the world.

Materials and methods

Types and other specimens of *Agathotanaeis manganicus* n.sp. and *A. ahyongi* n.sp. are deposited at the Australian Museum (AM). Types and other specimens of *A. spinipoda* n.sp. are in the Museum of Victoria (MV), Melbourne. Paratypes of *A. hanseni* are deposited in the American Museum of Natural History (AMNH), New York. Paratypes of *A. ingolfi* are located in the Zoological Museum of the University of Copenhagen (ZMUC), Denmark. Types of *A. splendidus*, *A. brevis* and *A. g hilarovi* are located in the Moscow State University Museum (MSU), Russia.

Station data are given in Table 1. DOMES (Deep Ocean Mining Environmental Study) data were collected by G.D.F. Wilson & party on *RV Oceanographer*—sampler: Sandia 0.25 m² box core. Station list data for other “DOMES site A” stations are given in Thistle & Wilson (1987). Slope data were collected by G.C.B. Poore & party and M.F. Gomon & party on *RV Franklin*—sampler: epibenthic sled; station list and data for other “slope” stations are given in Kornicker & Poore (1996).

Table 1. Station list: DOMES (Deep Ocean Mining Environmental Study) site A; Clipperton and Clarion fracture zone; equatorial Pacific abyssal plain. Slope stations: southeastern Australian shelf.

DOMES #1	station DJ02	09°23.52'N	151°32.94'W	5155 m	23 Nov 1977
DOMES #1	station DJ15	09°20.30'N	151°24.10'W	5166 m	26 Nov 1977
DOMES #1	station DJ20	09°19.80'N	151°35.10'W	5260 m	27 Nov 1977
DOMES #1	station DJ23	09°33.23'N	151°38.33'W	4934 m	28 Nov 1977
DOMES #1	station DJ38	09°36.30'N	151°58.00'W	5086 m	03 Dec 1977
DOMES #2	station DJ41	09°22.70'N	151°28.00'W	5191 m	18 May 1978
DOMES #2	station DJ50	09°22.10'N	151°58.00'W	5086 m	20 May 1978
DOMES #2	station DJ66	09°27.00'N	151°35.90'W	5250 m	25 May 1978
DOMES #2	station DJ69	09°15.80'N	151°30.70'W	5049 m	25 May 1978
DOMES #2	station DJ72	09°33.80'N	151°21.30'W	5240 m	27 May 1978
DOMES #2	station DJ73	09°28.10'N	151°15.60'W	5107 m	27 May 1978
DOMES #2	station DJ77	09°21.30'N	151°21.50'W	5034 m	28 May 1978
slope	station 27	38°25.00'S	149°00.00'E	1500 m	22 Jul 1986
slope	station 32	38°21.90'S	149°20.00'E	1000 m	23 Jul 1986
slope	station 33	38°19.60'S	149°24.30'E	930 m	23 Jul 1986
slope	station 40	38°17.70'S	149°11.30'E	400 m	24 Jul 1986
slope	station 53	34°52.72'S	151°15.04'E	996 m	22 Oct 1988
slope	station 67	38°23.95'S	149°17.02'E	1277 m	25 Oct 1988
slope	station 69	38°29.33'S	149°19.98'E	1840 m	26 Oct 1988

Systematics

Suborder Tanaidomorpha Sieg, 1980

Superfamily Paratanoidea Lang, 1949

Family Anarthruridae Lang, 1971a

Subfamily Anarthrurinae Lang, 1971a

Tribe Agathotanaini Lang, 1971a

Genus *Agathotanaeis* Hansen, 1913

Synonymy. *Agathotanaeis* Hansen, 1913, 3(3): 8, 63, 64.—Nierstrasz, 1913, 32a: 38.—Barnard, 1920, 17: 331.—Zimmer, 1926, 3(1): 686, 690, 696.—Lang, 1949, 42(18): 7.—Shiino, 1952, 2(2): 63.—Beklemishev, 1958, 1: 268, 298.—Lang, 1968, 1: 160.—Kudinova-Pasternak, 1970, 86: 370.—Lang, 1971a, 21: 57–59.—Lang, 1971b, 23: 363–365.—Sieg, 1973, 33: 282.—Gardiner, 1975, 170: 179.—Sieg, 1976, 14: 178.—Bird & Holdich, 1988, 22: 1592, 1597.—Bird & Holdich, 1989, 23: 137.—Kudinova-Pasternak, 1990, 126: 100.

Diagnosis (modified after Hansen, 1913; Lang, 1971b and Bird & Holdich, 1988): cuticle heavily calcified and deeply pitted. Antennule with 3 articles. Pleon narrower than pereon and pleotelson. Antenna greatly reduced, more so in female than male. Mandible molar process consisting of membranous lobe only. Left mandible lacina mobilis absent or reduced to knoblike process fused with incisor. Maxillule endite with 7–11 spines. Labium with anterolateral processes and mostly with medial plumose setae. Maxilliped endites circular or hexagonal. Except for the distal part of cheliped and pereopod dactylus, all appendages setulose. Chelipeds slender, attached to cephalothorax ventrally and not via carapal sclerite. Pereopods 4–6 dactylus and terminal spine not fused. Uropods short, stout, uniramous and uniaarticulate.

Type species: *Agathotanaeis ingolfi* Hansen, 1913

Gender: masculine.

Remarks. *Agathotanaeis* is unique within the Tanaidomorpha because of the reduced antenna. Within the Anarthruridae, no other genera display even remotely similar reductions although both the *Paranarthrura* and *Paragathotanaeis* share some generic features.

Agathotanaeis splendius and *A. brevis* are incompletely described from few specimens. Specimens of these species could not be obtained for revision. The validity of these species is therefore uncertain.

The status of *A. hanseni* is similarly problematic. Lang (1971b) did not illustrate the diagnostic characters in his description of this species. The holotype is apparently lost (as well as that of *A. ingolfi*) and the paratypes are all in poor condition. One specimen of *A. hanseni* was reported from the Atlantic near the Azores (Lang, 1971b). This specimen, however, could not be located and, considering the identification problems associated with tanaids, the Atlantic record may be a misidentification. Lang (1971b) stated that *A. ingolfi* could be distinguished from *A. hanseni* by the following characters: (a) width/length ratio of pereonite 4–5, greater in *A. ingolfi* (P4 = 1.0, P5 = 1.1) than *A. hanseni* (P4 = 0.78, P5 = 0.85); (b) anterolateral carapace margins convex for *A. hanseni* and concave for *A. ingolfi*; (c) eleven heavy setae on the maxillule of *A. hanseni*, while 10 in *A. ingolfi*. Some specimens in the Northwest Atlantic, however, had convex anterolateral margins (*A. hanseni* character) and a width/length ratio of P4 = 1.0, P5 = 1.05 corresponding to that of *A. ingolfi* (Larsen, in press). The *A. hanseni* paratype specimens have suffered various degrees of air-drying. They appear to have shrunk in width rather than length thus obscuring this character. Little confirmation is gained from examining the shape of the carapace on the paratypes, because two specimens lack the head altogether and another is male (the males of the two species shows no morphological differences). On the two complete female specimens, the anterior corners of the carapace are convex. The stout setae on the maxillule are not a reliable taxonomic character because they are known to be ontogenetically dependent (Larsen & Wilson, 1998) and are also inconspicuous in the two species (Bird & Holdich, 1988: 1598). The latter authors also suggest caution regarding this character.

Kudinova-Pasternak (1989) illustrates the pleopod as belonging to the female and the mandibles as belonging to the male for *A. ghilarovi*. This, however, is an editorial mistake and the text describe these, correctly, as male pleopods and female mandibles.

Agathotanaeis manganicus n.sp.

Material examined. HOLOTYPE (AM): 1 ovigerous ♀, DOMES site A, station DJ 23, (body length = 2.9 mm), AM P51003. PARATYPES (AM): 1 nonovigerous ♀, DOMES site A station DJ20, mouthparts and limbs dissected, AM P50999; 1 nonovigerous ♀, DOMES site A station DJ02, cut in two, mounted on SEM stub and coated, AM P50997.

Other material. 1 fragmented ♀, 2 manca, DOMES site A station DJ23; 1 nonovigerous ♀ (fragmented), DOMES site A station DJ50; 1 ovigerous ♀, DOMES site A station DJ66; 1 juvenile ♀, DOMES site A station DJ72.

Diagnosis of female. Antennule article 1 longer than all distal articles together, antenna with 2 articles, longer than 0.5 length of antennule first article. Pereonite 6 longer than broad.

Etymology. Name refers to the Manganese Nodule Province where the specimens were collected.

Description of adult female (Fig. 1A,B). *Body* cylindrical, slender. *Cephalothorax* (Fig. 1C) shorter than first 2 pereonites combined, anterolateral corners slightly concave. *Pereonites* tapering posteriorly, pereopod shoulders placed anteriorly on pereonites 1–3, about midlength on pereonite 4 and posteriorly on pereonites 5 and 6. *Pereonite 1* wider than long (l/w ratio 0.8), shorter than all other pereonites. *Pereonite 2–6* l/w ratios 1.0, 1.15, 1.5, 1.5, 1.1 respectively. *Pleon.* *Pleonites* of similar size, narrower than pereon and pleotelson. *Pleotelson* as long as last 3 pleonites together, apex margin straight. *Antennule* (Fig. 1M) with 3 articles. *Article 1* longer than rest of antennule, with 1 simple seta midlength and 1 distally. *Article 2* less than 0.25 times article 1 length, with 1 simple seta distally. *Article 3* 0.4 times longer than article 2, cone shaped with 5 simple setae and 1 aesthetasc distally. *Antenna* (Fig. 1N) 2-articulate, longer than 0.5 length of antennule first article, with 2 distal simple setae. *Mouthparts.* *Labrum* (Fig. 1D), distal margin rather flat, setose. *Mandibles*, molar process consisting of only a membranous lobe. *Left mandible* (Fig. 1E) lower part of incisor pointed; lacina mobilis absent. *Right mandible* (Fig. 1F), incisor bifurcate, upper part pointed, lower part blunt. *Maxillule* (Fig. 1H) endite with 7 distal thick setae; palp broken off. *Maxilla* (Fig. 1I) elongated without recognisable features. *Labium* (Fig. 1J) with anterolateral processes and a plumose spiniform seta midlength. *Maxilliped* (Fig. 1K) basis fused medially. Endite hexagonal, not fused medially and more heavily setose on anterolateral corners. Palp article 1 outer margin longer than inner, smooth; article 2 inner margin longer than outer and with 3 distal setulate setae; article 3 with 3 setulate setae on inner margin; article 4 with 5 distal setulate setae. *Epignath* (Fig. 1L) with distal setules. *Cheliped* (Fig. 2G). *Basis* quadrate, half the length of carpus. *Merus* with 1 simple setae sternally. *Carpus*, about as long as propodus, with 2 simple setae at midlength on sternal margin. *Propodus* (Fig. 2H) with 1 simple seta medially on sternal margin and 1 by dactylus insertion. *Fixed finger* with 3 distal setae on inner margin; distal tooth bifurcate. *Dactylus* with small process by insertion of distal tooth. *Oostegites* (Fig. 1G) originating from pereonite 1–4. Anterior margin of oostegite 1 with scattered setules. *Pereopod 1* (Fig. 2A). *Basis* longer than next 3 articles together, setulate but otherwise smooth. *Ischium* with 1 distal simple seta on each margin. *Merus* expanding in width distal, half as long as carpus, with 1 distal simple seta on tergal margin. *Carpus* as long as dactylus and terminal spine together, with 1 simple seta on tergal margin and 1 medial on distal margin. *Propodus* 0.25 times longer than carpus, with 1 simple long seta and 2 distal short setae. *Dactylus* and terminal spine shorter than propodus. *Pereopod 2* (Fig. 2B) similar to pereopod 1 except *basis* with 1 seta near midlength on sternal margin; *ischium* smooth; *carpus* with

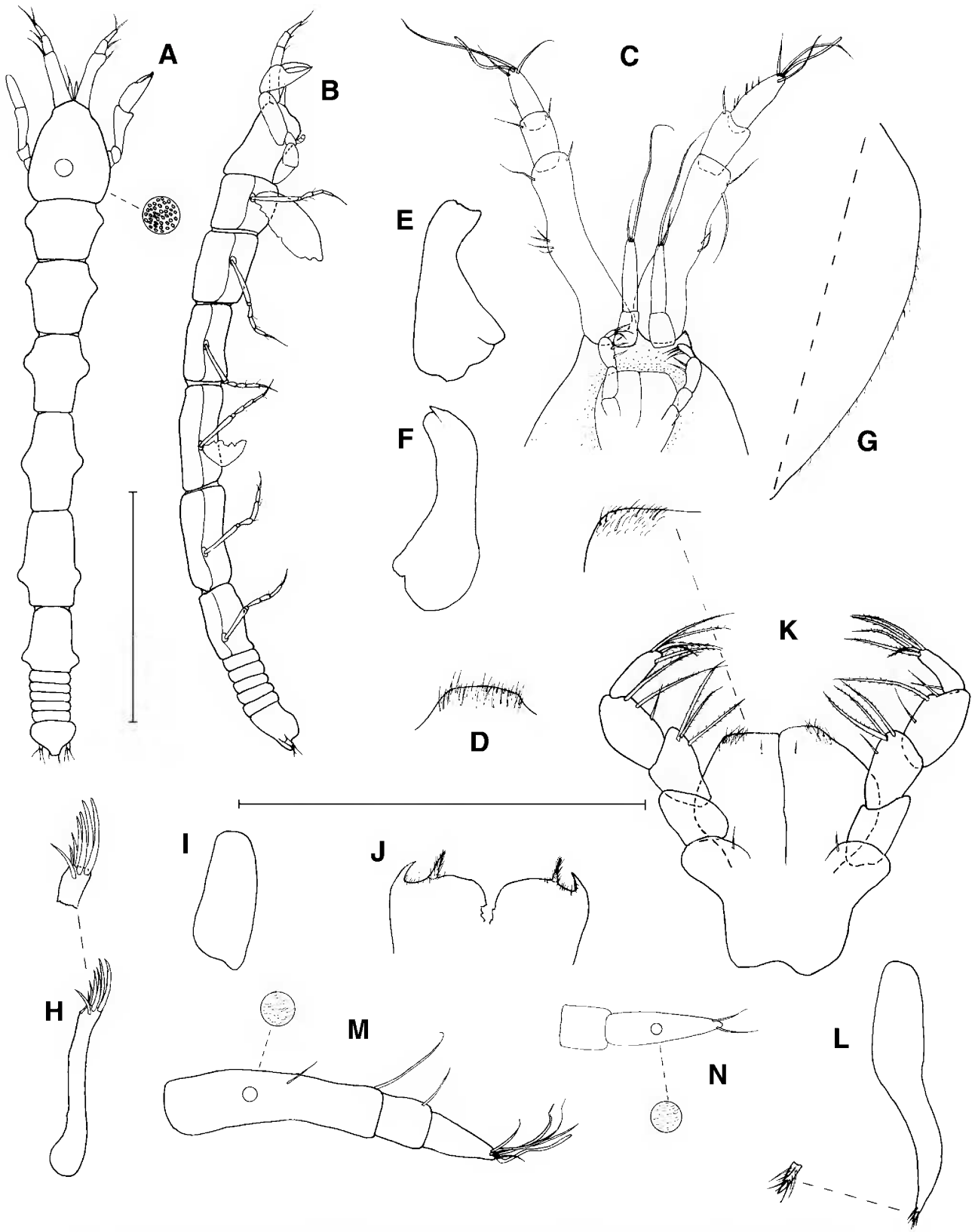


Figure 1. *Agathotanais manganicus* n.sp., A–C, ♀ holotype, AM P51003—A, dorsal view; B, lateral view; C, ventral view of anterior carapace; scale bar for A and B = 1 mm. *Agathotanais manganicus* n.sp. D–N, ♀ paratype, AM P50999—D, labrum; E, left mandible; F, right mandible; G, anterior margin of first oostegite; H, maxillule, palp not shown; I, maxilla; J, labium; K, maxilliped; L, epignath; M, antennule; N, antenna; scale bar for mouthparts = 0.25 mm.

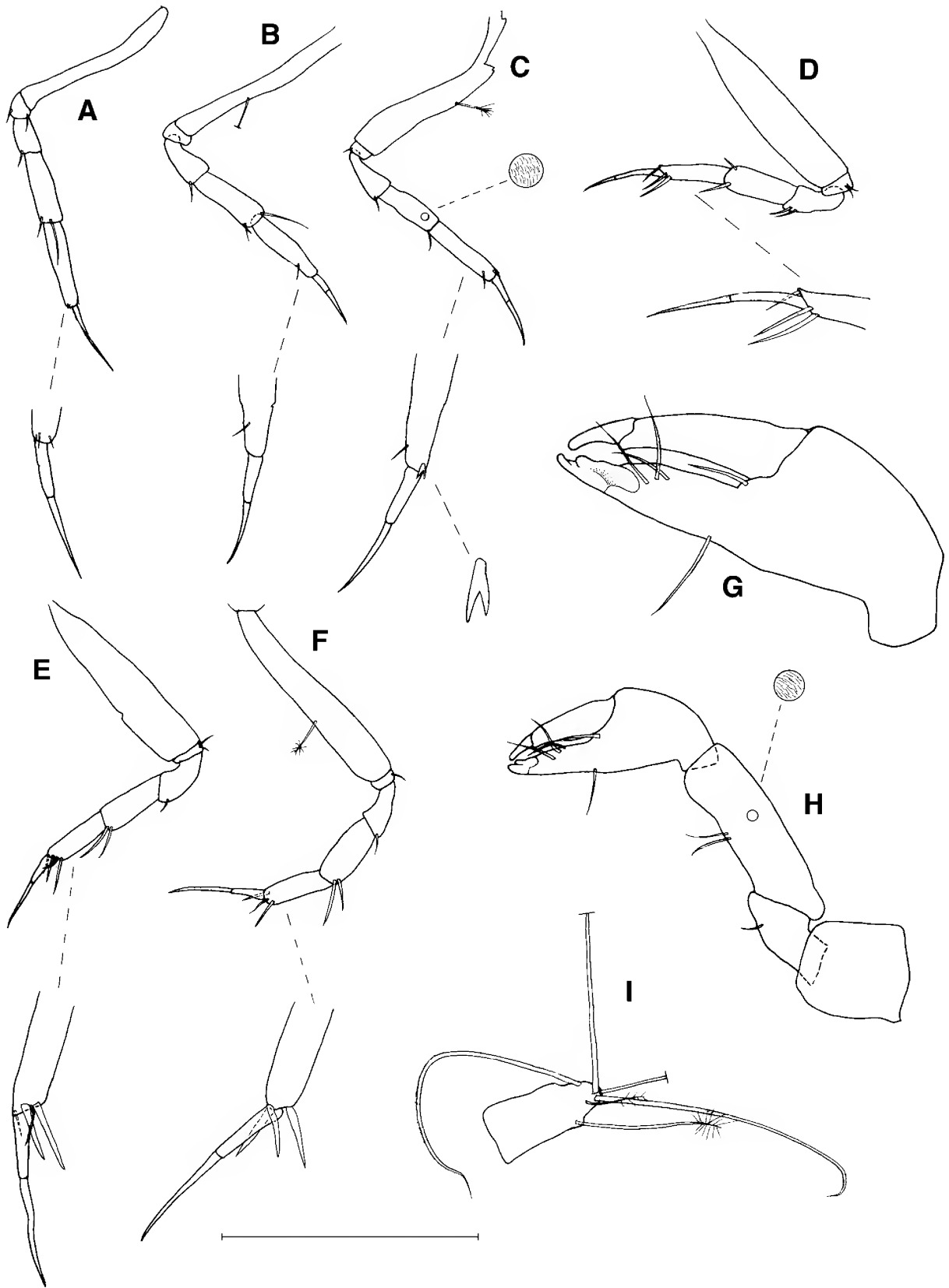


Figure 2. *Agathotanais manganicus* n.sp., ♀ paratype AM P50999—A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pereopod 6; G, cheliped; H, cheliped propodus and dactylus; I, uropod; scale bar = 0.3 mm.

2 distal simple setae on tergal margin and 1 sternally; *propodus* with 1 short simple seta on tergal margin. *Pereopod 3* (Fig. 2C) similar to pereopod 1 except *basis* with 1 plumose seta near midlength on sternal margin; *ischium* with 1 seta only; *carpus* with 1 distal seta on tergal margin; *propodus* with 1 short simple seta on tergal margin, and a denticulate scale on sternal margin. *Pereopod 4* (Fig. 2D) similar to pereopod 1 except *basis* somewhat wider; *merus* with 2 distal simple stout setae on tergal margin; *carpus* with 1 distal simple stout seta on tergal margin and 1 simple short seta on sternal margin; *propodus* with 2 distal simple stout setae on tergal margin and 1 simple short seta on sternal margin. *Pereopod 5* (Fig. 2E) similar to pereopod 4 except *merus* with 1 distal simple seta on tergal margin; *carpus* with 2 distal simple stout setae on tergal margin. *Pereopod 6* (Fig. 2F) similar to pereopod 4 except *basis* with 1 plumose seta midlength on sternal margin; *ischium* with 1 simple seta only; *merus* with 1 distal simple seta on tergal margin; *carpus* with 2 distal simple stout setae on tergal margin; *propodus* with 3 distal simple stout setae on tergal margin. *Pleopods* absent in females. *Uropods* (Fig. 2I) uniramous. *Endopod* uniarticulate, with 3 long, 1 short simple and 1 short plumose seta distally, exopodal process with 1 long distal plumose long.

Remarks. The unique two articulated antenna of *Agathotanaïs manganicus* n.sp. is considered the most pleiomorphic condition within *Agathotanaïs* and made it necessary to modify the generic diagnosis.

Agathotanaïs ahyongi n.sp.

Material examined. HOLOTYPE (AM): 1 nonovigerous ♀ (body length 3.7 mm), DOMES site A station DJ69, AM P51007. PARATYPES: 1 nonovigerous ♀, mouthparts and limbs dissected; 1 ♂, 1 juvenile ♀, 2 manca, DOMES site A station DJ73, AM P51009. 1 nonovigerous ♀, DOMES site A station DJ38, cut in two, mounted on SEM stub and coated, AM P51002. 1 ♂, DOMES site A station DJ 77, AM P51013.

Diagnosis. Antennule article 1 no longer than rest of antennule. Antenna reduced into lobes not visible in the compound scope. *Labium* without median plumose seta. Pereonite 6 longer than broad (l/w ratio 1.4).

Etymology. Named after my friend and fellow student Shane T. Ah Yong.

Description of adult female (Fig. 3A,B). *Body* cylindrical, slender. *Cephalothorax* (Fig. 3O) shorter than first 2 pereonites; anterolateral corners convex. *Pereonites*. Pereopod shoulders placed anteriorly on pereonite 1, near midlength on pereonites 2–4 and posteriorly on pereonites 5 and 6. *Pereonite 1* wider than long l/w ratio 0.9, shorter than other pereonites. *Pereonite 2–6* l/w ratio 1.3, 1.4, 1.6, 1.7, 1.4 respectively. *Pleon*. *Pleonites* of similar size, narrower than pereon and pleotelson. *Pleotelson* longer than last 3 pleonites together, rounded in lateral view, apex margin straight. *Antennule* (Fig. 3E) with 3 articles. *Article 1* as long as rest of antennule, with 1 simple seta midlength

and 3 distally. *Article 2* less than 0.5 times of article 3 length, smooth. *Article 3* with 4 long setae distally. *Antenna* (Fig. 3N). Minute lobe-like structures without setae. *Mouthparts*. *Labrum* (Fig. 3G), distal margin with small medial lobe, setose. *Labium* (Fig. 3L) with anterolateral processes but without plumose seta midlength. *Mandibles* molar process consists of membranous lobe only. *Left mandible* (Fig. 3H) 0.3 times larger than right mandible; incisor with 3 denticles; lacina consisting of 1 small lobe and a minute accessory lobe. *Right mandible* (Fig. 3I) incisor with 3 denticles. *Maxillule* (Fig. 3J) endite with 7 distal thick setae; palp broken off. *Maxilla* (Fig. 3K) elongate without recognisable features. *Maxilliped* (Fig. 3M) basis fused medially. Endite elongate, not fused medially and more heavily setose on anterolateral corners. Palp article 1 quadrate, smooth; article 2 rectangular, with 1 distal seta; article 3 with 2 setae on inner margin; article 4 with 4 distal setae. *Epignath* not found. *Cheliped* (Fig. 4A). *Basis* rectangular, less than half length of carpus. *Merus* smooth, ovoid. *Carpus*, about as long as propodus, smooth. *Propodus* (Fig. 4B) tergal surface irregular at widest point, with 1 simple seta midlength on sternal margin. *Fixed finger* with 1 distal seta on each margin and blunt process by insertion of distal tooth. *Dactylus* with 2 small spiniform setae on inner margin but without bifurcate process at distal tooth insertion. *Oostegites*. No ovigerous specimens found. *Pereopod 1* (Fig. 4C). *Basis* longer than next 3 articles together, setulate but otherwise smooth. *Ischium* smooth. *Merus* expanding in width distally, shorter than carpus, smooth. *Carpus* longer than dactylus and terminal spine together, with 1 distal simple seta. *Propodus* as long as carpus, with row of small tergal setae. *Dactylus* and terminal spine 0.5 propodus. *Pereopod 2* (Fig. 4D) similar to pereopod 1 except *ischium* with 1 sternal seta; *merus* with 1 sternal seta; *carpus* with 2 short sternal setae. *Pereopod 3* (Fig. 4E) resembles pereopod 2 except *carpus* with 2 longer sternal setae. *Pereopod 4* (Fig. 4F). *Basis* somewhat wider than 3 preceding pereopods, smooth. *Ischium* with 1 simple seta. *Merus* expanding in width distally, with 1 distal simple seta on tergal margin. *Carpus* longer than propodus, with 2 distal simple stout seta. *Propodus* with 3 distal simple stout setae. *Dactylus* and terminal spine marginally shorter than propodus. *Pereopod 5* (Fig. 4G) resembles pereopod 4 except *basis* tergal margin with 2 plumose setae; *merus* with 2 distal tergal setae; *carpus* with 3 distal stout simple setae; *propodus* with 3 distal simple stout setae and row of evenly spaced small simple setae on tergal margin; *dactylus* lost. *Pereopod 6* (Fig. 4H) similar to pereopod 4 except *basis* with 1 plumose seta; *ischium* smooth; *merus* with 2 setae; *carpus* with 3 distal simple stout setae; *propodus* with 3 distal stout setae and row of small setae; *dactylus* and terminal spine longer than propodus. *Pleopods* absent in females. *Uropods* (Fig. 3N) uniramous, uniarticulate and with 2 short and 2 distal long simple setae.

Description of male (Fig. 3C,D). *Pereon*. Pereonite 1 longer and narrower than female, shoulders less prominent. *Pleotelson* only marginally wider than pleon. *Pleopods* (Fig. 3F). All 5 pairs similar. *Exopod* and *endopod* armed with 8 simple setae on rami.

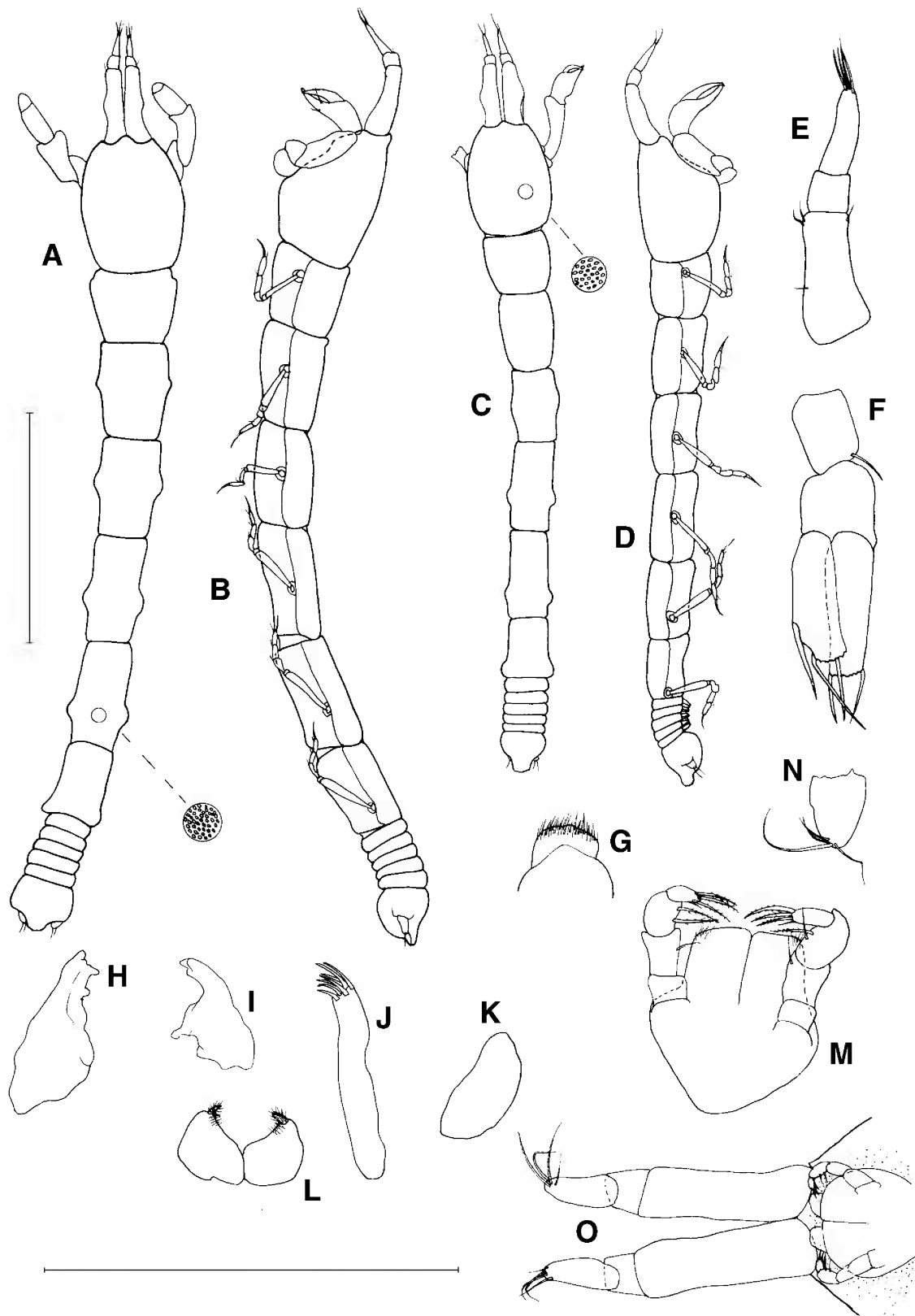


Figure 3. *Agathotanaeis ahyongi* n.sp., A, B & O, ♀ holotype AM P51007—A, dorsal view, scale bar = 1.0 mm; B, lateral view; O, cephalothorax, ventral view. *Agathotanaeis ahyongi* n.sp., C, D & F, juvenile ♂ paratype AM P51009—C, dorsal view; D, same lateral view; F, pleopod. *Agathotanaeis ahyongi* n.sp., E, G–N, ♀ paratype AM P51009—E, antennule; G, labrum; H, left mandible; I, right mandible; J, maxillule, palp not shown; K, maxilla; L, labium; M, maxilliped; N, uropod; scale bar for mouthparts = 0.25 mm.

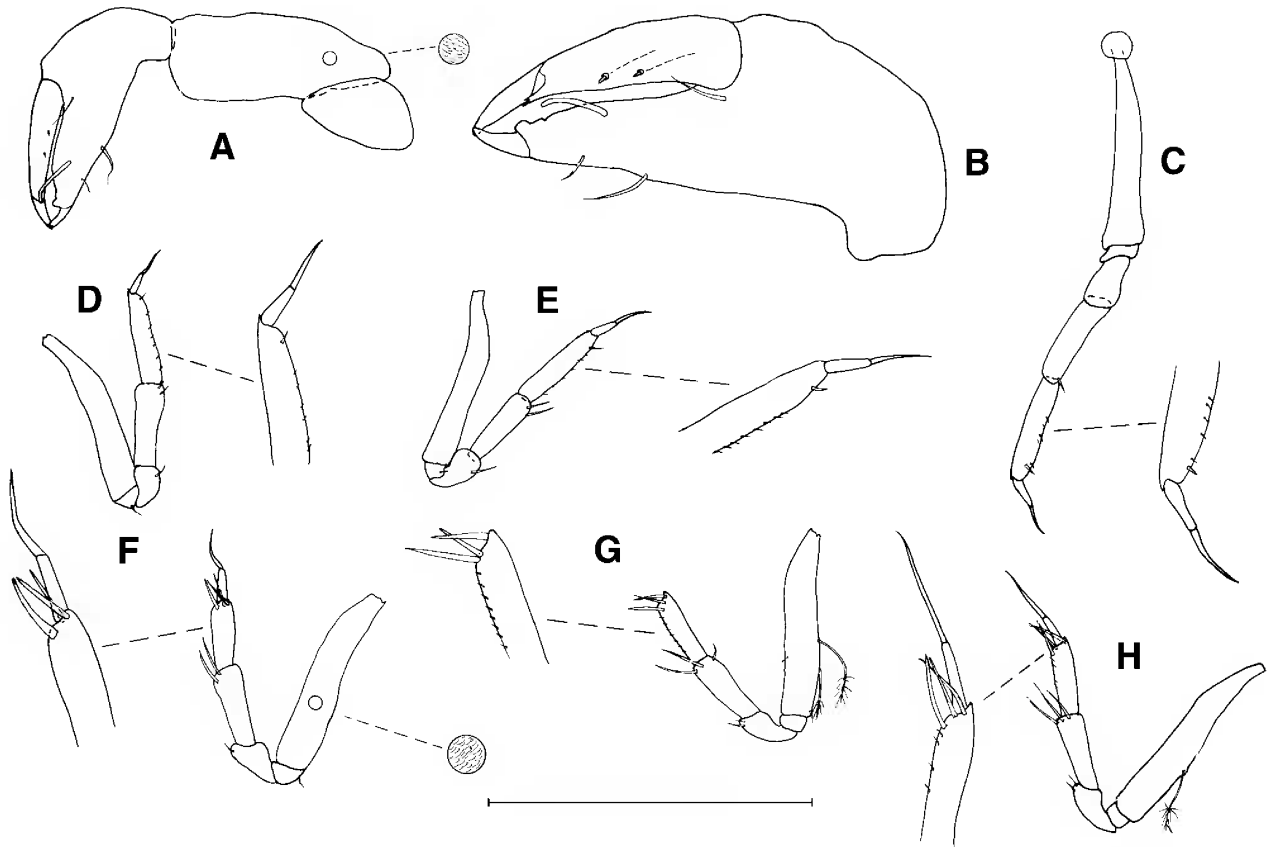


Figure 4. *Agathotanaeis ahyongi* n.sp., ♀ paratype AM P51009—A, cheliped; B, cheliped propodus and dactylus; C, pereopod 1; D, pereopod 2; E, pereopod 3; F, pereopod 4; G, pereopod 5; H, pereopod 6; scale bar = 0.3 mm.

Remarks. The reduction of the antenna to a lobe-like process reflects highest degree of reduction of this appendage within the Tanaidacea. The mouthparts of this species are significantly smaller than in other *Agathotanaeis* species.

***Agathotanaeis spinipoda* n.sp.**

Material examined. HOLOTYPE (MV): 1 nonovigerous ♀ (body length 3.6 mm), slope station 69, MV J37856. PARATYPES (MV): 1 nonovigerous ♀, mouthparts and limbs dissected, slope station 27, MV J37880; 1 nonovigerous ♀, slope station 27, cut in two, mounted on SEM stub and coated, MV J37880.

Other material (MV). 26 nonovigerous ♀♀, 2 ♂♂, 11 juvenile ♀♀, 3 juvenile ♂♂, slope station 69; 1 nonovigerous ♀, 2 ♂♂, 1 manca II, slope station 32; 1 nonovigerous ♀, slope station 53; 1 ♂, slope station 33; 2 nonovigerous ♀♀, slope station 67; 10 nonovigerous ♀♀, 2 ♂♂, slope station 27; 8 nonovigerous ♀♀, 1 ♂, slope station 40.

Diagnosis. Antennule article 1 longer than rest of antennule. Antenna less than 0.3 times of antennule article 1 length. Pereopod 4–6 propodus with row of small spines. Pereonite 6 wider than long (l/w ratio 0.9). Uropods not extending beyond pleotelson apex.

Etymology. Name refers to the unusual spines on the propodus and carpus of pereopods 4–6.

Description of adult female (Fig. 5A,B). *Body* cylindrical, stout. *Cephalothorax* (Fig. 5G) shorter than first 2 pereonites, anterolateral corners slightly concave. *Pereonites*. Pereopod shoulders are placed anteriorly on pereonite 1, midlength on pereonites 2–4 and posteriorly on pereonites 5 and 6. *Pereonite 1* wider than long, l/w ratio 0.6, shorter than other pereonites. *Pereonite 2–6* l/w ratio 0.7, 0.85, 0.95, 1.05, 0.9. *Pleon.* *Pleonites* of similar size, narrower than pereon and pleotelson. *Pleotelson* as long as last 2 pleonites together, apex margin straight. *Antennule* (Fig. 5E) with 3 articles. *Article 1* twice as long as rest of antennule, with 2 simple setae midlength and 4 distally. *Article 2* 0.5 times article 3 length, with 1 distal thick seta. *Article 3* with at least 2 distal long setae. *Antenna* (Fig. 5F) uniaarticulate, less than 0.3 times antennule article 1, with row of small setae. *Mouthparts.* *Labrum* (Fig. 6A), distal margin with small medial lobe, setose. *Left mandible* (Fig. 6B) incisor bifurcate, lacina consists of tiny lobe only. *Right mandible* (Fig. 6C) incisor consists of 1 blunt tooth. *Labium* (Fig. 6D) with anterolateral processes and plumose spiniform seta midlength. *Mandibles* molar process consisting of membranous lobe only. *Maxillule* (Fig. 6E)

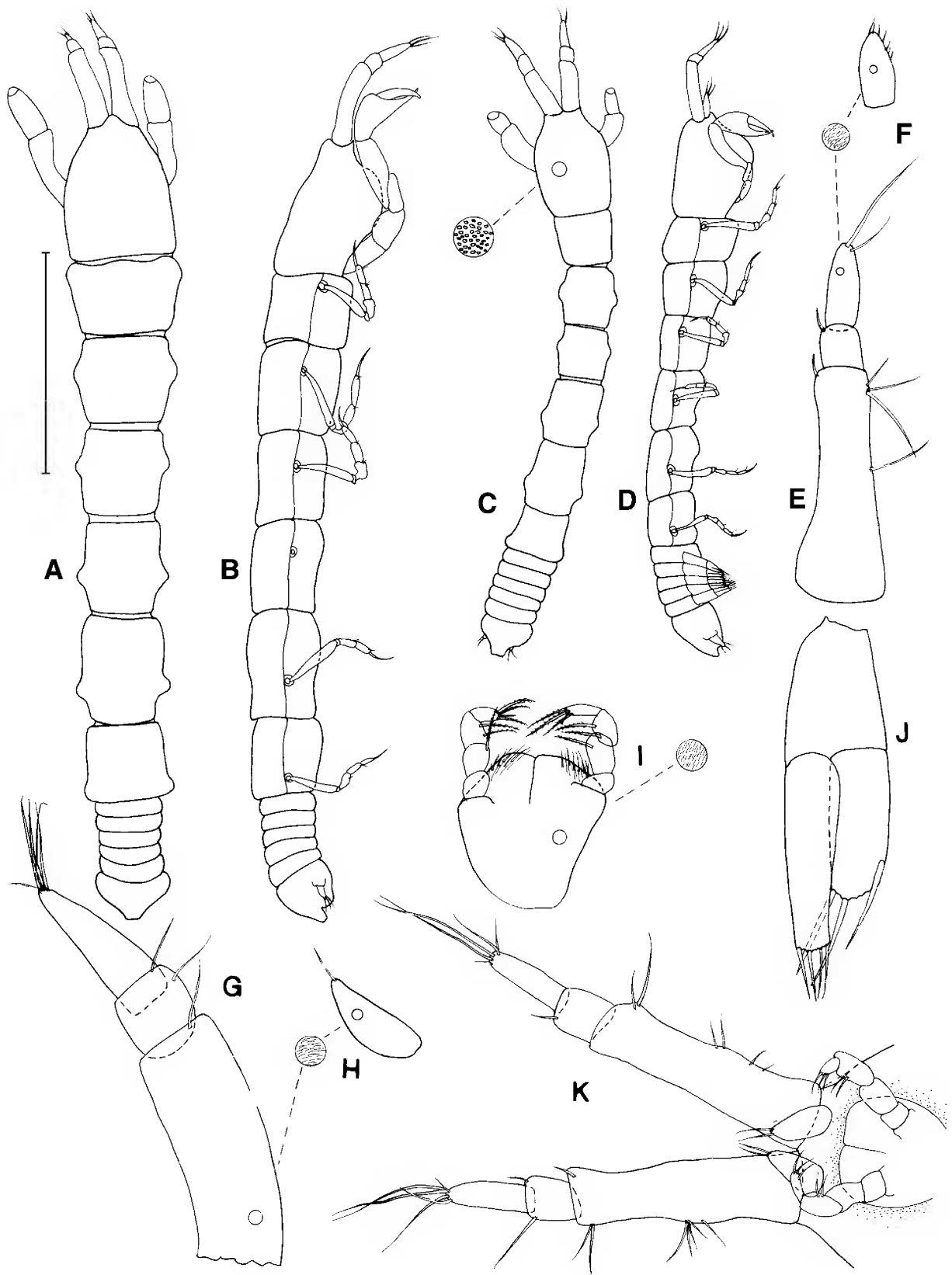


Figure 5. *Agathotanais spinipoda* n.sp., A, B & K, ♀ holotype MV J37856; C, D, G–J, ♂ paratypes, and E, F, ♀ paratype, MV J37880. A, ♀ dorsal view, scale bar = 1.0 mm. B, same lateral view; C, ♂ dorsal view; D, same lateral view; E, ♀ antennule; F, ♀ antenna; G, ♂ antennule; H, ♂ antenna; I, ♂ maxilliped; J, pleopod; K, cephalothorax, ventral view.

endite with 7 distal thick setae; palp broken off. *Maxilla* (Fig. 6F) extremely elongate with no discernible features. *Maxilliped* (Fig. 6G) basis fused medially. Endites with proximal lobes and more heavily setose on anterolateral corners. Palp article 1 outer margin longer than inner, smooth; article 2 inner margin longer than outer and with 3 distal setae; article 3 with 3 setae on inner margin; article 4 with 4 distal setae. *Epignath* (Fig. 6H) with distal setules. *Cheliped* (Fig. 7G). *Basis* rectangular, less than half the length of carpus. *Merus* with 1 simple seta sternally. *Carpus* subequal to propodus, with 1 simple seta midlength and 1 distally on each margin. *Propodus* (Fig. 7H) tergal surface uneven at widest point, with 1 simple seta midlength on sternal margin and 1 by dactylus insertion. *Fixed finger* with 2 distal setae on inner margin and pointed process by insertion of distal tooth. *Dactylus* with bifurcate process next to insertion of distal tooth and 2 small spiniform setae on inner margin. *Oostegites*. No ovigerous specimens found. *Pereopod 1* (Fig. 7A). *Basis* longer than next 3 articles together, setulate but otherwise smooth. *Ischium* with 1 distal simple seta on tergal margin. *Merus* expanding in width distally, shorter than carpus, with 2 distal simple setae on tergal margin. *Carpus* shorter than dactylus and terminal spine together, with 1 distal simple seta on each margin. *Propodus* 0.3 times longer than carpus, with 1 distal simple seta and denticulate scale. *Dactylus* and terminal spine as

long as propodus. *Pereopod 2* (Fig. 7B) similar to pereopod 1 except *merus* smooth, *propodus* with 1 distal short spine on sternal margin. *Pereopod 3* (Fig. 7C) similar to pereopod 1 except *carpus* with 2 distal setae on tergal and 1 on sternal margin. *Pereopod 4* (Fig. 7D). *Basis* somewhat wider than on other pereopods; tergal margin with 2 plumose setae sternally with 1 simple seta. *Ischium* band shaped with 2 distal simple setae. *Merus* expanding in width distally, with 2 distal simple setae on tergal margin. *Carpus* as long as propodus, with 1 simple stout seta distally and 3 short spines on tergal margin. *Propodus* with 3 distal simple stout setae and 5 short spines on tergal margin. *Dactylus* and terminal spine longer than propodus and weakly setulate. *Pereopod 5* (Fig. 7E) similar to pereopod 4 except *basis* tergal margin with 2 plumose setae, *propodus* with 3 tergal spines, *dactylus* and terminal spine appear smooth. *Pereopod 6* (Fig. 7F) similar to pereopod 4 except *basis* without plumose setae, *merus* with 1 seta only, *carpus* with 1 distal simple stout seta and 2 short spines on tergal margin, *propodus* with 3 distal stout setae and 3 short spines on tergal margin, *dactylus* and terminal spine appear smooth. *Pleopods* absent in females. *Uropods* (Fig. 7I) uniramous, uniaarticulate and with 3 long and 1 short simple and 1 distal plumose seta and 1 simple and plumose setae at point of narrowing. Long simple seta on exopod process.

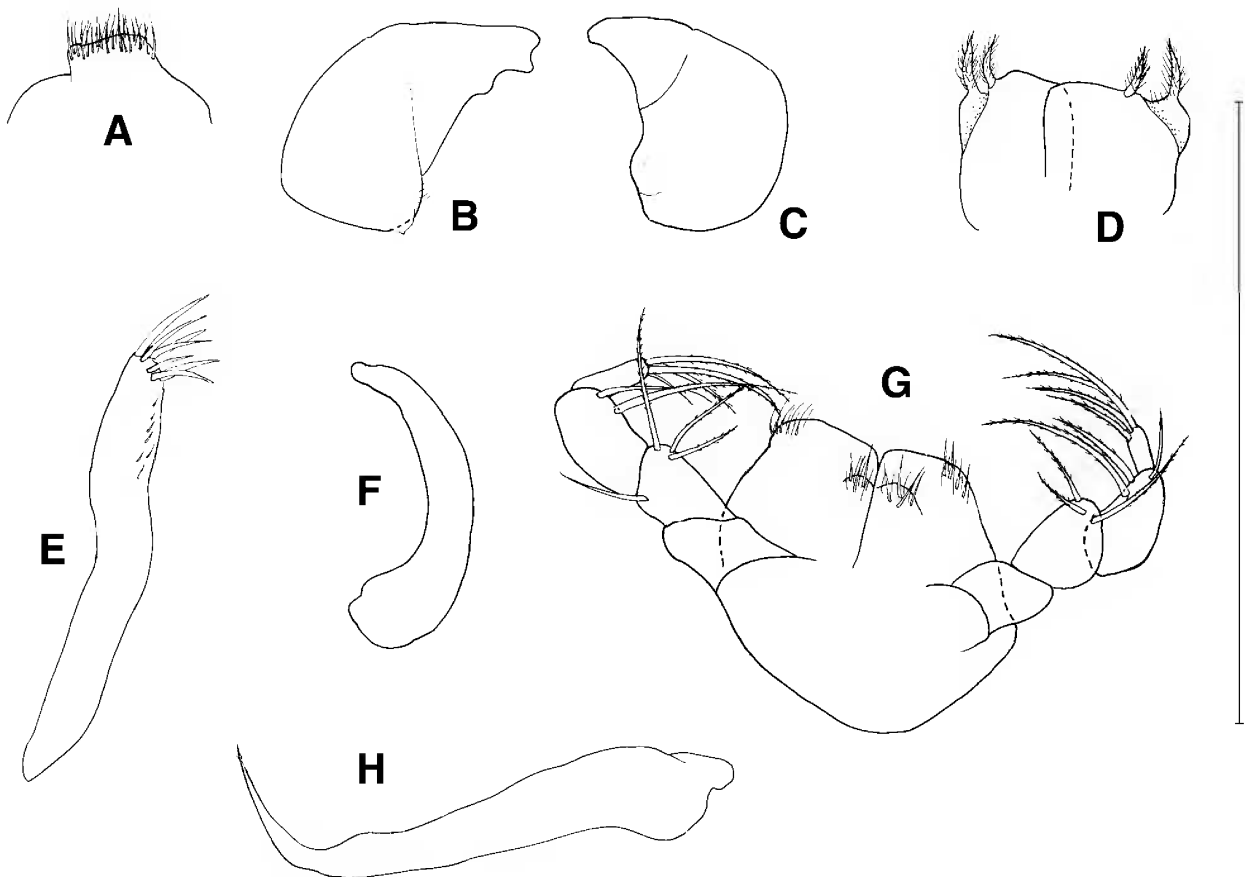


Figure 6. *Agathotanaeis spinipoda* n.sp., ♀ paratype MV J37880—A, labrum; B, left mandible; C, right mandible; D, labium; E, maxillule, palp not shown; F, maxilla; G, maxilliped; H, epignath; scale bar = 0.25 mm.

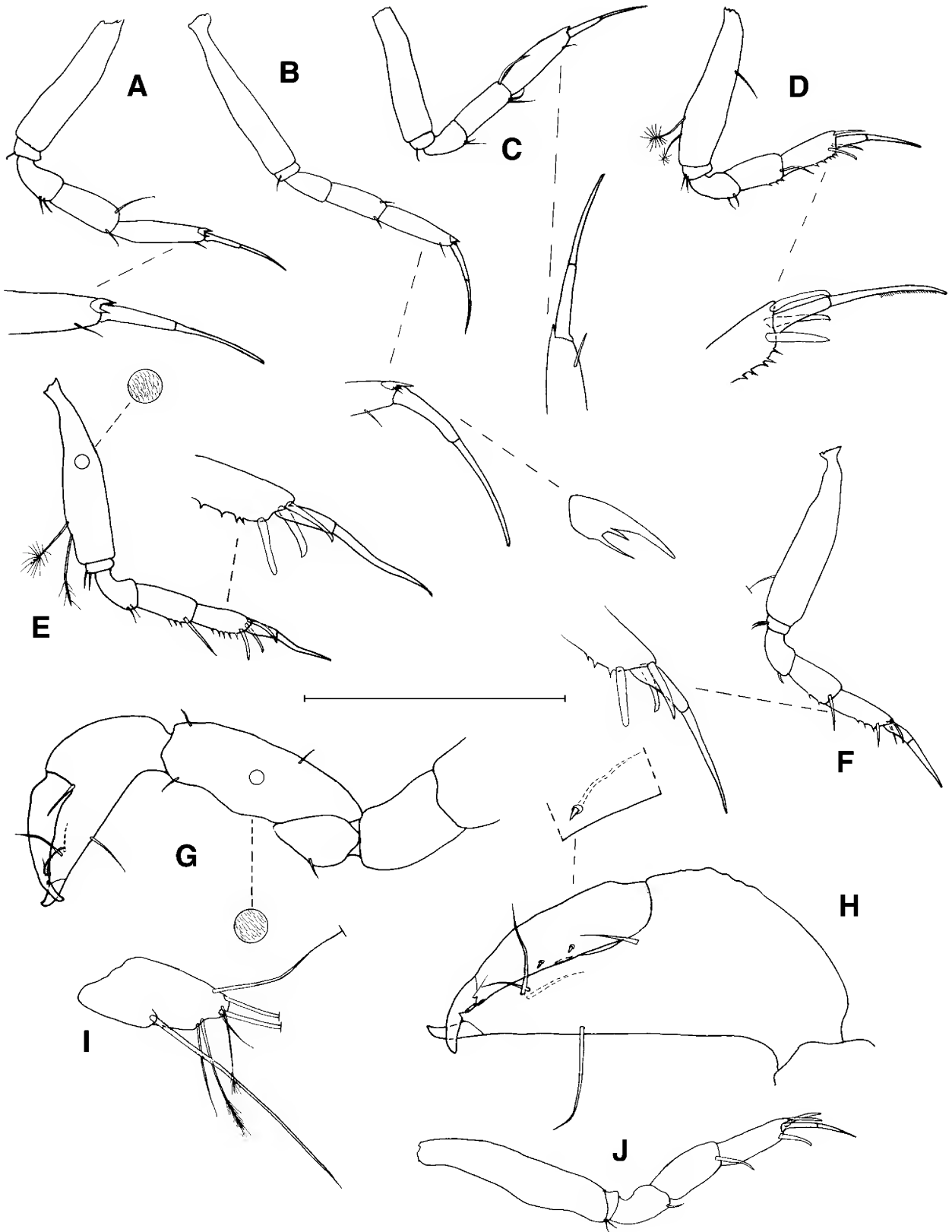


Figure 7. *Agathotanaeis spinipoda* n.sp., A–I, ♀ paratype MV J37880. A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pereopod 6; G, cheliped; H, cheliped propodus and dactylus; I, uropod; J, ♂ pereopod 5; scale bar = 0.3 mm.

Description of male (Fig. 5C,D). *Pereon*. Pereopod 1 longer and narrower than that of female, shoulders less prominent. *Pleotelson* not wider than pleon. *Maxilliped* (Fig. 5I) smaller than female and endites without proximal lobes. *Antennule* (Fig. 5G) thicker and longer than in female (more than 0.25 times), with distal aesthetasc. *Antenna* (Fig. 5H) 0.5 times longer than female antenna. *Pereopods* (Fig. 7J) without propodus spines. *Pleopods* (Fig. 5J). All 5 pairs similar, *exopod* armed with 8 and *endopod* with 7 simple setae on rami.

Remarks. A common species on the southeast Australian slope at bathyal depths (400–1840 m). The tubes made of mud sediment particles and a few sponge spicules. *Agathotanaïs spinipoda* n.sp. shares the pereopod 4–6 spine character with *A. ghilarovi* but can be distinguished from it by the lack of maxilliped endite denticles, by the broad antennule and longer antennule article 1.

Agathotanaïs sp. incertae sedis

Material examined. 1 nonovigerous ♀, DOMES site A station DJ41; 1 manca, DOMES station DJ15. Additional material originally identified as *Agathotanaïs hanseni*, are possibly also this species but the poor condition of the specimens does not allow confirmation; 2 nonovigerous ♀♀, 1 fragment, USAP station 3, “Chilii Trench”, 16°12'S 74°41'W, 2599–5858 m; 2 nonovigerous ♀♀, USAP station 12, Taomin Sea, 40°00.42'S 153°00.03'W, 4564 m.

This species is not described because only one adult specimen is available. It is, however, easily distinguished from the other species of *Agathotanaïs* by the pleotelson apex being sharply pointed.

Key to species of the genus *Agathotanaïs*

- 1 Antenna absent *A. ahyongi* n.sp.
- Antenna present 2
- 2 Antenna consisting of 2 articles *A. manganicus* n.sp.
- Antenna uniarticulate 3
- 3 Pereopod 4 propodus with tergal row of small spines 7
- Pereopod 4 propodus without tergal row of small spines 4
- 4 Pereonites 4 + 5 wider than long. Carapace as long as pereonites
1 + 2 together *A. brevis**
- Pereonites 4 + 5 longer than wide or subequal. Carapace shorter
than pereonites 1 + 2 together 5
- 5 Pereonites 4 + 5 subequal in length and width *A. ingolfi*
- Pereonites 4 + 5 longer than wide 6
- 6 Pleon narrower than pereon *A. hanseni*
- Pleon as wide as pereon *A. splendidus**
- 7 Antennule article 1 almost 3 times longer than article 3. Maxilliped
endites without caudodistal denticles *A. spinipoda* n.sp.
- Antennule article 1 only 1.5 times longer than article 3. Maxilliped
endites with caudodistal denticles *A. ghilarovi**

* Specimens of *Agathotanaïs splendidus*, *A. ghilarovi* and *A. brevis* could not be obtained and key characters are taken from the original descriptions only.

Discussion

Sieg (1983) stated that *Agathotanaeis* is defined by apomorphic characters but without direct references to which. Sieg (1983) did, however, claim that most reductions within the Tanaidacea are apomorphic character trends. If this is true, then the apomorphic characters are: 3-articulated antennule, rudimentary antenna, reduction of adult male mouthparts and absence of uropodal exopod. A preliminary phylogenetic analysis using the Apseudomorpha, Neotanaidomorpha and *Tanaeis* as outgroups, supports this view and suggests that the other diagnostic features (i.e. ventral cheliped attachments, heavily calcified cuticle, labial processes, modified male pleopods) are also apomorphic trends, while the limited sexual dimorphism is a plesiomorphic character (Larsen, research in progress).

Within *Agathotanaeis* the above mentioned reductions vary considerably. The long, 2-articulated antenna of *A. manganicus* n.sp. may represent a plesiomorphic character state, approaching that of the *Paragathotanaeis* and *Paranarthrura*. The reduction of the antenna to a lobe-like structure in *A. ahyongi* n.sp. may represent an apomorphic trend. *Agathotanaeis ahyongi* also displays a loss of median plumose seta on the labium, otherwise thought to be an apomorphic generic character. The reduction of male mouthparts have long been considered an apomorphic trend (Sieg, 1986). This reduction is closely coupled to sexual maturity (Lang, 1953). As seen in *A. spinipoda* n.sp., juvenile male *A. spinipoda* (defined by the incompletely developed pleopods) did have a complete set of mouthparts, resembling, but not identical to, those of the adult female. Males with completely developed pleopods retain only a small maxilliped and the epignath.

Agathotanaeis as currently defined, is a cosmopolitan genus, found in the northeast- and northwest Atlantic, southeast Atlantic, Central American Pacific slope, mid- and northeast Pacific, the eastern slope of Australia and in the Indian Ocean. This distribution pattern is similar to that of most tanaid genera. So far, extensive new Pacific/Australian material has revealed only one genus (*Bathytanaeis*), which appears to have a distribution restricted to the Australian region. Tanaids may thus follow the distribution patterns of amphipods and cumaceans in the deep sea and not those of isopods (Hessler & Wilson, 1983).

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